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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/713,445	11/14/2003	David Alan Burton	END9-2002-0061US1	9621

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EXAMINER	
WALTER, CRAIG E	
ART UNIT	**PAPER NUMBER**
2188	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/31/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/713,445	BURTON ET AL.	
	Examiner	Art Unit	
	Craig E. Walter	2188	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 November 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26 and 28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26 and 28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9 November 2006 has been entered.

Status of Claims

2. Claims 1-26, and 28 are pending in the Application.

Claims 1, 4, 10, 12, 16, 23, 24 and 28 have been amended.

Claim 27 remains canceled.

Claims 1-26, and 28 are rejected.

Response to Amendment

3. Applicant's amendments and arguments filed on 9 November 2006 in response to the office action mailed on 10 August 2006 have been fully considered, but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-13, 15-26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dunham (US Patent 6,269,431 B1), in further view of Manley et al. (US PG Publication 2003/0182325 A1), hereinafter Manley.

As for claim 1, Dunham teaches an apparatus for managing incremental storage, the apparatus comprising:

a policy management module (host - Fig. 1, element 20) configured to set a storage management policy for storage capacity of a virtual volume (secondary storage - Fig. 1, element 29), wherein the virtual volume is configured to store storage data from an storage operation on a primary volume and the virtual volume comprises a storage pool that includes at least one storage volume (col. 19, lines 36-47 – the storage pool comprises at least one secondary and virtual volume).

a storage pool management module (backup agent - Fig. 1, element 25) configured to monitor available storage capacity of the virtual volume and to change the storage capacity in response to the storage management policy and the available storage capacity (the backup agent responds to a request made by the host for a backup routine (i.e. change in storage capacity). The backup agent monitors the capacity by checking if any spare storage is available – Fig. 15 flow chart, col. 21, lines 16-63), wherein changing the storage capacity comprise allocating and de-allocating a storage volume to the virtual volume in response to the change to the storage capacity (Fig. 15, if a spare volume is available, the next virtual volume will be assigned to it –

col. 21, lines 16-63). Note additionally Dunham teaches de-allocating volumes in the storage after modification access – col. 6, line 33 through col. 7, line 17; and

an incremental log (secondary directory - Fig. 1, element 28)

corresponding to the virtual volume, the incremental log configured to map a virtual address assigned to the incremental storage data to a physical storage address of the at least one storage volume of the virtual volume (col. 7, line 18 through col. 8, line 15 and Fig. 10 – secondary directory is responsible for appending information to a file (i.e. log) to track and map information stored in the storage pool).

Despite these teachings Dunham fails to specifically teach incremental snapshots (i.e. storage) as claimed by Applicant, rather he teaches performing a full backup.

Manley however discloses a system and method for asynchronous mirroring of snapshots at a destination using a purgatory directory and inode mapping in which incremental snapshots are added subsequent to the base snapshot (paragraph 0074, all lines).

It would have been obvious to one of ordinary skill in the art at the time of the invention for Dunham to further include Manley's asynchronous mirroring of snapshots into his own virtual storage system. By doing so, Dunham have a more efficient snapshot mechanism, capable of only storing and transferring data that has been modified, rather than performing a full backup as taught by Manley in paragraph 0015, all lines.

As for claims 12 and 24, Dunham teaches a method (and medium comprising code configured) for managing incremental storage, the method (and code) comprising (configured to):

monitoring available storage capacity of the virtual volume and to change the storage capacity in response to the storage management policy and the available storage capacity (the backup agent responds to a request made by the host for a backup routine (i.e. change in storage capacity). The backup agent monitors the capacity by checking if any spare storage is available – Fig. 15 flow chart, col. 21, lines 16-63), wherein the virtual volume is configured to store incremental storage data from an incremental storage operation on a primary volume and the virtual volume comprises a storage pool that includes at least one storage volume (col. 19, lines 36-47 – the storage pool comprises at least one secondary and virtual volume).

allocating and de-allocating a storage volume to the storage pool in response to the change to the storage capacity of the virtual volume (Fig. 15, if a spare volume is available, the next virtual volume will be assigned to it – col. 21, lines 16-63. Note additionally Dunham teaches de-allocating volumes in the storage after modification access – col. 6, line 33 through col. 7, line 17),; and

mapping an incremental log (secondary directory - Fig. 1, element 28) corresponding to the virtual volume a virtual address, assigned to the incremental storage data to a physical storage address of the at least one storage volume of the storage pool (col. 7, line 18 through col. 8, line 15 and Fig. 10 – secondary

directory is responsible for appending information to a file (i.e. log) to track and map information stored in the storage pool).

Despite these teachings Dunham fails to specifically teach incremental snapshots (i.e. storage) as claimed by Applicant, rather he teaches performing a full backup.

Manley however discloses a system and method for asynchronous mirroring of snapshots at a destination using a purgatory directory and inode mapping in which incremental snapshots are added subsequent to the base snapshot (paragraph 0074, all lines).

It would have been obvious to one of ordinary skill in the art at the time of the invention for Dunham to further include Manley's asynchronous mirroring of snapshots into his own virtual storage system. By doing so, Dunham have a more efficient snapshot mechanism, capable of only storing and transferring data that has been modified, rather than performing a full backup as taught by Manley in paragraph 0015, all lines.

As for claim 16, Dunham teaches a system for managing incremental storage, the system comprising:

a primary volume (col. 19, lines 36-47 describes at least one primary and virtual volume);

a baseline volume configured to store a baseline backup copy of data on the primary volume (Fig. 1, element 29 – secondary storage);

a storage pool (secondary storage - Fig. 1, element 29) configured to store incremental storage data from an incremental storage operation on the primary volume in response to changes in data stored on the primary volume after storing the baseline backup copy on the baseline volume, where the storage pool comprises at least one storage volume allocated as a virtual volume (col. 19, lines 36-47 – the storage pool comprises at least one secondary and virtual volume). Referring to Fig. 15, the host instructs the backup agent to allocate storage area volumes during required for the backup operation;

a policy management module (host - Fig. 1, element 20) configured to set a storage management policy for storage capacity of a virtual volume (secondary storage - Fig. 1, element 29);

a storage pool management module (backup agent - Fig. 1, element 25) configured to monitor available storage capacity of the virtual volume and to change the storage capacity in response to the storage management policy and the available storage capacity (the backup agent responds to a request made by the host for a backup routine (i.e. change in storage capacity). The backup agent monitors the capacity by checking if any spare storage is available – Fig. 15 flow chart, col. 21, lines 16-63), wherein changing the storage capacity comprise allocating and de-allocating a storage volume to the storage pool in response to the change to the storage capacity (Fig. 15, if a spare volume is available, the next virtual volume will be assigned to it – col. 21, lines 16-63). Note additionally Dunham teaches de-allocating volumes after modification access – col. 6, line 33 through col. 7, line 17; and

an incremental log (secondary directory - Fig. 1, element 28) corresponding to the virtual volume, the incremental log configured to map a virtual address assigned to the incremental storage data to a physical storage address of the at least one storage volume of the virtual volume (col. 7, line 18 through col. 8, line 15 and Fig. 10 – secondary directory is responsible for appending information to a file (i.e. log) to track and map information stored in the storage pool).

. Despite these teachings Dunham fails to specifically teach incremental snapshots (i.e. storage) as claimed by Applicant, rather he teaches performing a full backup.

Manley however discloses a system and method for asynchronous mirroring of snapshots at a destination using a purgatory directory and inode mapping in which incremental snapshots are added subsequent to the base snapshot (paragraph 0074, all lines).

It would have been obvious to one of ordinary skill in the art at the time of the invention for Dunham to further include Manley's asynchronous mirroring of snapshots into his own virtual storage system. By doing so, Dunham have a more efficient snapshot mechanism, capable of only storing and transferring data that has been modified, rather than performing a full backup as taught by Manley in paragraph 0015, all lines.

As for claim 23, Dunham teaches an apparatus for managing incremental storage, the apparatus comprising:

means for monitoring available storage capacity of the virtual volume and to change the storage capacity in response to the storage management policy and the available storage capacity (the backup agent responds to a request made by the host for a backup routine (i.e. change in storage capacity). The backup agent monitors the capacity by checking if any spare storage is available – Fig. 15 flow chart, col. 21, lines 16-63), wherein the virtual volume is configured to store incremental storage data from an incremental storage operation on a primary volume and the virtual volume comprises a storage pool that includes at least one storage volume (col. 19, lines 36-47 – the storage pool comprises at least one secondary and virtual volume).

means for allocating and de-allocating a storage volume to the storage pool in response to the change to the storage capacity of the virtual volume (Fig. 15, if a spare volume is available, the next virtual volume will be assigned to it – col. 21, lines 16-63. Note additionally Dunham teaches de-allocating volumes in the storage after modification access – col. 6, line 33 through col. 7, line 17) - col. 19, lines 36-47 – the storage pool comprises at least one secondary and virtual volume; and

means for mapping an incremental log (secondary directory - Fig. 1, element 28) corresponding to the virtual volume a virtual address, assigned to the incremental storage data to a physical storage address of the at least one storage volume of the storage pool (col. 7, line 18 through col. 8, line 15 and Fig.

10 – secondary directory is responsible for appending information to a file (i.e. log) to track and map information stored in the storage pool).

Despite these teachings Dunham fails to specifically teach incremental snapshots (i.e. storage) as claimed by Applicant, rather he teaches performing a full backup.

Manley however discloses a system and method for asynchronous mirroring of snapshots at a destination using a purgatory directory and inode mapping in which incremental snapshots are added subsequent to the base snapshot (paragraph 0074, all lines).

It would have been obvious to one of ordinary skill in the art at the time of the invention for Dunham to further include Manley's asynchronous mirroring of snapshots into his own virtual storage system. By doing so, Dunham have a more efficient snapshot mechanism, capable of only storing and transferring data that has been modified, rather than performing a full backup as taught by Manley in paragraph 0015, all lines.

As for claim 28, Dunham teaches a method for deploying a computer readable medium for managing incremental storage, the method comprising:

determining customer requirements for incremental storage (Fig. 1, element 23 – the user (i.e. customer) inputs the backup requirements via the host, element 20). This input helps the system to determine the specifics of backup required by said user;

deploying a storage management program for managing incremental storage, the storage management program comprising (the backup agent's operations are deployed via the backup software (Fig. 1, element 224))

monitoring available storage capacity of the virtual volume and to change the storage capacity in response to the storage management policy and the available storage capacity (the backup agent responds to a request made by the host for a backup routine (i.e. change in storage capacity). The backup agent monitors the capacity by checking if any spare storage is available – Fig. 15 flow chart, col. 21, lines 16-63), wherein the virtual volume is configured to store incremental storage data from an incremental storage operation on a primary volume and the virtual volume comprises a storage pool that includes at least one storage volume (col. 19, lines 36-47 – the storage pool comprises at least one secondary and virtual volume).

allocating and de-allocating a storage volume to the storage pool in response to the change to the storage capacity of the virtual volume (Fig. 15, if a spare volume is available, the next virtual volume will be assigned to it – col. 21, lines 16-63. Note additionally Dunham teaches de-allocating volumes after modification access – col. 6, line 33 through col. 7, line 17) - col. 19, lines 36-47 – the storage pool comprises at least one secondary and virtual volume; and

mapping an incremental log (secondary directory - Fig. 1, element 28) corresponding to the virtual volume a virtual address, assigned to the incremental storage data to a physical storage address of the at least one

storage volume of the storage pool (col. 7, line 18 through col. 8, line 15 and Fig. 10 – secondary directory is responsible for appending information to a file (i.e. log) to track and map information stored in the storage pool). and;

maintaining the storage management program (col. 15, lines 32-54 – the backup program can be reprogrammed and loaded via a floppy disk).

Despite these teachings Dunham fails to specifically teach incremental snapshots (i.e. storage) as claimed by Applicant, rather he teaches performing a full backup.

Manley however discloses a system and method for asynchronous mirroring of snapshots at a destination using a purgatory directory and inode mapping in which incremental snapshots are added subsequent to the base snapshot (paragraph 0074, all lines).

It would have been obvious to one of ordinary skill in the art at the time of the invention for Dunham to further include Manley's asynchronous mirroring of snapshots into his own virtual storage system. By doing so, Dunham have a more efficient snapshot mechanism, capable of only storing and transferring data that has been modified, rather than performing a full backup as taught by Manley in paragraph 0015, all lines.

As for claim 2, Dunham teaches the physical storage address as comprising a volume identifier (col. 6, lines 33-63, the pointer points to each physical unit (i.e. the

directory intrinsically stores information to identify the address of the data stored in the memory, with the corresponding physical volume)).

As for claim 3, Dunham teaches the storage pool management module as being further configured to allocated and de-allocate a portion of a storage volume to the storage pool (Fig. 15, if a spare volume is available, the next virtual volume will be assigned to it – col. 21, lines 16-63. Note additionally Dunham teaches de-allocating volumes after modification access – col. 6, line 33 through col. 7, line 17), wherein the storage pool comprises at least one storage volume allocated as a virtual volume (col. 19, lines 36-47 – the storage pool comprises at least one secondary and virtual volume).

As for claims 4, 15 and 26, Dunham teaches the apparatus (method and medium) as further comprising a read module configured to read data stored in the virtual volume by way of a data path independent from a data path used to store the storage data (Fig. 2, each host (31, 32, 33) can read data from each storage system via a plurality of paths (i.e. through the ring network (30)). More specifically, each host can communicate either with the secondary storage device either directly, or indirectly via either of the two data storage subsystems)

As for claim 5, Dunham teaches the storage management module as allocating and de-allocating storage volumes without user input (once the backup policy is set, the host communicates with the backup agent irrespective of the user input in order to effectively manage and backup the volumes (Fig. 15)).

As for claim 6, Dunham teaches the storage pool management module as being further configured to allocate a second storage volume to the virtual volume in response to a reduction in available space on a first storage volume (Fig. 15, more volumes will be allocated to create sufficient memory to store the copied data),

As for claims 7 and 8, Dunham teaches the storage pool as comprising a RAID storage array (col. 9, lines 34-53).

As for claim 9, Dunham teaches the incremental log as comprising a lookup table (the directory is used by the system to look up the correspondence between physical and virtual addresses – col. 7, line 18 through col. 8, line 15).

As for claim 10, Dunham teaches the storage pool management module as further configured to increase the storage capacity in response to the available storage capacity increasing above a first storage capacity threshold and to decrease the storage capacity in response to the available storage capacity decreasing below a second storage capacity threshold (Fig. 15, the allocation and de-allocation is dynamically determined based on available storage capacity).

As for claim 11, Dunham teaches the storage pool management module as being further configured to de-allocate storage volumes wherein the de-allocated storage volumes are available for allocation to a virtual volume unrelated to the storage pool (referring to Fig. 2, the plurality of data storage subsystems allows for the de-allocation of memory within one of the subsystems. The de-allocated data may at a later time be reallocated, just not to a storage area within the other subsystems storage pools).

As for claims 13 and 25, Dunham teaches providing incremental snapshot data of the primary volume in response to a replication operation (col. 5, lines 57 through col. 6, line 6 – the snapshot operation is performed in response to the backup operation).

As for claim 17, Dunham teaches a replication module configured to transmit the incremental data from the primary volume to the storage pool (Fig. 3, element 56 – the remote link adapter is used to transmit data from the primary storage subsystem to the secondary (i.e. storage pool)).

As for claim 19, Dunham teaches:

the primary volume comprising a plurality of primary volumes (Fig. 3, elements 59-62);

the storage pool comprising a storage pool corresponding to each volume (the secondary storage area stores backup data of the primary volume in order to maintain a copy of the data that corresponds to the data stored in the primary volumes);

the incremental log comprising an incremental log corresponding to each storage pool (col. 7, line 18 through col. 8, line 15); and

the storage pool management module monitors available capacity of each storage pool and allocates and de-allocates storage volumes for each storage pool (the backup agent responds to a request made by the host for a backup routine (i.e. change in storage capacity). The backup agent monitors the capacity by checking if any spare storage is available – Fig. 15 flow chart, col. 21, lines 16-63), wherein the storage pool is configured to store incremental storage data from an incremental storage operation

on a volume (col. 19, lines 36-47 – the storage pool comprises at least one secondary and virtual volume).

As for claim 20, Dunham teaches the storage module as being further configured to allocated and de-allocate a portion of a storage volume to the storage pool (Fig. 15, if a spare volume is available, the next virtual volume will be assigned to it – col. 21, lines 16-63. Note additionally Dunham teaches de-allocating volumes after modification access – col. 6, line 33 through col. 7, line 17).

As for claim 21, Dunham teaches the baseline volume as being part of the storage pool (the baseline volume is contained within the secondary volume (Fig. 1, element 29)).

As for claim 22, Dunham teaches the policy management module as residing in a host (as per the rejection of claim 1, *supra*).

As for claim 18, Dunham teaches the incremental data comprising snapshot data of the primary volume (col. 5, lines 57 through col. 6, line 6 – the snapshot operation is performed in response to the backup operation).

Despite these teachings Dunham fails to specifically teach incremental snapshots (i.e. storage) as claimed by Applicant, rather he teaches performing a full backup.

Manley however discloses a system and method for asynchronous mirroring of snapshots at a destination using a purgatory directory and inode mapping in which incremental snapshots are added subsequent to the base snapshot (paragraph 0074, all lines).

It would have been obvious to one of ordinary skill in the art at the time of the invention for Dunham to further include Manley's asynchronous mirroring of snapshots into his own virtual storage system. By doing so, Dunham have a more efficient snapshot mechanism, capable of only storing and transferring data that has been modified, rather than performing a full backup as taught by Manley in paragraph 0015, all lines.

5. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dunham (US Patent 6,269,431 B1) and Manley (US PG Publication 2003/0182325 A1) as applied to claim 12 above, and in further view of Anaso et al. (US PG Publication 2003/0191909 A1), hereinafter Anaso.

As for claim 14, though Dunham in view of Manley teach all of the limitations of claim 12, they fail to teach changing a storage capacity of the storage pool as further comprising alerting a user of a storage over-italicization or under-utilization ad changing the storage capacity in response to user input.

Anaso however teaches a storage utilization monitoring system in which the system maintains a storage capacity table, which is used to notify the user in case of over or under utilization of storage capacity (paragraph 0047, all lines).

It would have been obvious to one of ordinary skill in the art at the time of the invention for Dunham and Manley to further include Anaso's storage utilization monitoring system into his own system of virtual storage devices for recovery of backup data. By doing so, Dunham would benefit by having a means more efficiently monitoring storage capacity by eliminating the need for a computer itself to perform the

monitoring process. This in turn would help Dunham's system to realize could help reduce system management costs incurred by system monitoring, as taught by Anaso (paragraph 0014, all lines).

Response to Arguments

The following arguments presented Applicant have been fully considered but are moot in view of the new grounds of rejection:

6. Under the heading "Rejection of claims 1-13, 15-26, and 28 under 35 U.S.C. §102(b)", Applicant asserts "Dunham does not teach, disclose or suggest an incremental storage operation, but instead teaches backups and snapshot copies of an entire volume" (paragraph 0007). Applicant additional states "Dunham teaches checking for spare capacity on the primary volume only as part of a backup *recovery* operation ... not as part of an *incremental storage* operation" (paragraph 0010). Applicant additionally states in paragraph 0012 that Dunham's cited incremental log is for snapshotted data and not for incremental storage data as recited by Applicant in this claim. In paragraph 0015, Applicant further contrasts instant claim 1 with Dunham by stating "the storage pool management module [of the instant application] allocates and de-allocates storage for an *incremental storage operation*, not the *full backup* and *restore* operations taught by Dunham". These arguments are rendered moot in view of the new grounds of rejection presented *supra*.

The following arguments presented by Applicant have been fully considered but they are not persuasive:

7. Under the heading "Rejection of claims 1-13, 15-26, and 28 under 35 U.S.C. §102(b)", Applicant asserts "Dunham teaches locating spare storage that is part of the primary volume, ... not changing storage capacity of a virtual volume that is mapped to a storage pool" (paragraph 0010), and further states "the actions of storage pool management module to change the storage capacity of the storage volume correspond to locating spare capacity in the primary volume. Applicant contends that this is inconsistent with Dunham's storage pool as corresponding to the secondary volume (Fig. 1, element 29) as asserted by Examiner. This argument however is not persuasive, as Examiner has clarified the rejections of these claims by explicitly stating that the management module is responsible for changing the capacity of the pool (which corresponds to the secondary storage in Dunham) when the snapshot occurs (i.e. by adding the snapshotted data to the secondary storage subsystem). Applicant additionally states in this paragraph "monitoring and changing the storage capacity of the storage pool is not equivalent to the actions of the backup agent 25, Figure 1 of Dunham in responding to a host for a backup routine. Again, locating storage capacity on the primary volume is in response to a restoration routine, not a backup routine". This argument is not persuasive, as Examiner maintains that the claim requires monitoring and changing the capacity in response to a change in storage capacity. Dunham teaches this limitation once the host determines a snapshot is needed, hence requiring a change in capacity for both the primary and secondary volumes.

8. In paragraph 0011, Applicant asserts that the cited text (col. 6, line 33 to col. 7, line 17) has nothing to do with the recovery process and has nothing to do with de-

allocating storage volumes of a storage pool. This argument is not persuasive as Examiner maintains the claim requires de-allocating in response to a change in storage capacity. Dunham teaches this limitation in col. 6, line 50 through col. 7, line 17 (volumes are de-allocated from the primary storage and stored in the secondary storage as a snapshot in order to free memory within the primary storage area).

9. In paragraph 0014, Applicant asserts that Dunham fails to teach, "the storage management module as being further configured to allocate and de-allocate a portion of a storage volume to the storage pool". This argument however is not persuasive as Examiner maintains that the secondary storage (i.e. pool) is configured to store data from the primary volumes (i.e. data is added to and removed from the secondary storage based on data included in a snapshot of the primary volume.

10. In paragraph 0015, Applicant concedes that some functions of the backup process are automated, however alleges that Dunham teaches the occurrence of backup in response to a user or to an application, hence fails to teach backing up without user input. This argument however is not persuasive. Assuming *arguendo* that Applicant is correct that the cited reference lines (col. 11, lines 25 through col. 12, line 23) do in fact teach backing the data up in response to user input, Dunham additionally teaches the host itself as initiating the backup process in these cited lines, hence Examiner has met his burden establishing a *prima facia* case of obviousness (Dunham in view of Manley) for this claim.

11. In paragraph 0016, Applicant asserts that Dunham's "storage is allocated for storing a backup only if the spare capacity is above the amount required to store a copy

of the backup". This argument however is not persuasive as Examiner maintains that volumes are in fact allocated during the snapshot in order to backup the data irrespective of the available capacity (i.e. memory must inherently be "allocated" for data for the data to be written to it).

12. In paragraphs 0017-0018, Applicant asserts that Dunham's fails to teach a first and second threshold to determine allocation and de-allocation respectively (i.e. Dunham does not teach specific threshold). This argument however is not persuasive as Examiner maintains that volumes are allocated and de-allocated based on capacity, therefore allocation occurs based on a first threshold (when the system determines that data must be stored), and a second threshold (i.e. more data storage area needed)). The fact that these thresholds are not statically set or determined bears no relevance on whether or not some sort of threshold *must* be met in order to either allocate or de-allocate memory location within the pool.

13. Under the heading "Rejection of claim 14 under 35 U.S.C. §103(a)", Applicant asserts that claim 14 is allowable for at least depending from an allegedly allowable claim (i.e. claim 12). This argument is not persuasive, as Examiner maintains that claim 12 remains rejected under 35 USC § 103(a) per the arguments and rejections discussed *supra*.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig E. Walter whose telephone number is (571) 272-8154. The examiner can normally be reached on 8:30a - 5:00p M-F.

15. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hyung S. Sough can be reached on (571) 272-6799. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

16. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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1-30-07